

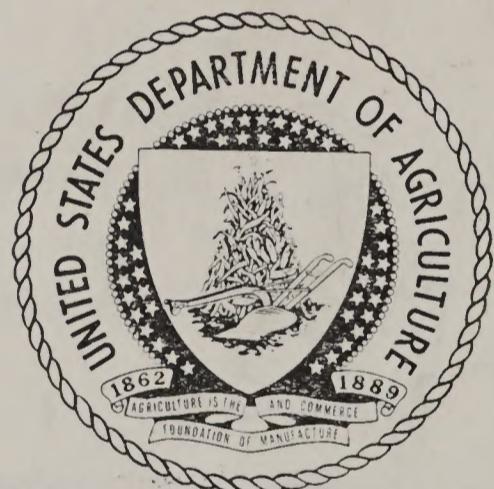
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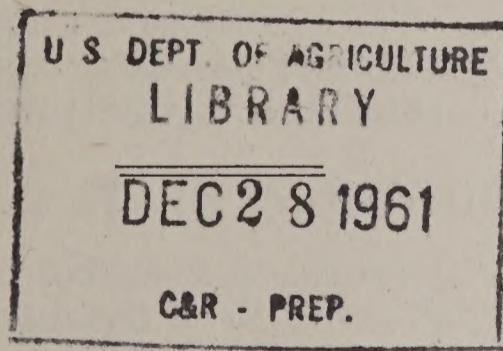
UNITED STATES DEPARTMENT OF AGRICULTURE.
FOREST SERVICE.
HENRY S. GRAVES, Forester.

In cooperation with the Associated Cooperage Industries of America.

TIGHT AND SLACK COOPERAGE STOCK PRODUCTION IN 1918.

By FRANKLIN H. SMITH AND ALBERT H. PIERSON,

Statisticians in Forest Products.



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TIGHT AND SLACK COOPERAGE PRODUCTION IN 1918.

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INTRODUCTION.

The reported production of tight cooperage stock in 1918 amounted to 286,401,000 staves and 20,711,271 sets of heading.¹ The output of staves was 24 per cent smaller than in 1909 and 20 per cent smaller than in 1911. The manufacture of heading was less than 1 per cent under that of 1909 and 32 per cent under 1911.

The reported aggregate output of slack cooperage stock in 1918 was 1,009,971,000 staves, 60,751,000 sets of heading, and 332,684,000 hoops. Slack stave manufacture was 50 per cent under that of 1909 and 24 per cent under that of 1911; heading production declined 57 per cent and 43 per cent in comparison with the figures for 1909 and 1911 respectively; and the output of hoops shrunk 11 per cent and 6 per cent from that of 1909 and 1911 respectively.

Changes of a marked character have taken place in the cooperage industry since 1911, the last year for which statistics are available. Demand for certain types of barrels has fluctuated as the business calling for a specific grade or type of container prospered or the tide of competition from containers made of other materials ebbed and flowed. The statement is equally true of tight and slack cooperage. The production of the latter has been rather strongly affected by the growth in the use of such substitutes as cotton, jute, and paper sacks and the veneer barrel or drum. On the other hand, the largely increased consumption of barrels for handling the output of cement and lime, as well as apples, vegetables, and other products of the orchard and farm, has resulted in helping to maintain a moderately high level of production. The wave of prohibition which has swept the country is reflected in the figures on tight cooperage manufacture. For instance, where millions of beer and ale staves were produced in former years, the data for 1918 measure the output in hundreds of thousands.

TIGHT STAVE PRODUCTION.

Figures on tight stave production are shown in Table 1. The quantity of staves of all classes produced in 1918 was 20 per cent smaller than in 1911, the last year for which statistics are available. Sawed stave production amounted to 280,171,000 pieces, a 10 per cent reduction from

¹ Statistics on the production of tight cooperage stock in 1905 were compiled and published by the Forest Service. Beginning in 1906, and continued up to and including 1911, statistics on the production of both tight and slack cooperage stock were published annually by the Bureau of the Census in cooperation with the Forest Service.

Upon the solicitation of the Associated Cooperage Industries of America, the Forest Service collected data on cooperage stock production for the first six month of 1918. The results were issued in the form of a mimeographed statement in December, 1918. Early in 1919 production figures for the last six months of 1918 were collected and combined with those for the earlier period so as to show the data for the entire year. The statistics are presented in this bulletin with comparative figures for earlier years.

the 1911 figures. The oil and tierce class production of 191,602,000 staves and the half-barrel and keg class amounting to 28,159,000 pieces represent an increase of 36 per cent and 40 per cent, respectively, over the previous period. Pork barrel staves numbering 9,366,000 pieces show a decrease of 19 per cent. The 15,690,000 spirit and wine staves is a decrease of 57 per cent from 1911, and the 950,000 bourbon staves a decrease of 956 per cent; the production of both classes of staves reflects the lessened demand for containers from the distilleries and wineries.

The output of hewed staves dropped from 7,187,000 in 1911 to 4,295,000 in 1918, or 40 per cent. The production is characterized by a heavy increase in pipe staves and a decrease in French claret staves. The number of pieces of pipe staves reported cut in 1918 is nearly six times greater than the figures for 1911; French claret stave output decreased 66 per cent.

Bucked and split stave production in 1918 amounted to 1,391,000 pieces in comparison with 20,020,000 pieces turned out in 1911. The decline was well distributed among the several kinds of staves produced. This class of stave was largely utilized in the handling of distillates and wines.

There was more pronounced decline of beer and ale stock. The reported output of this class of staves in 1918 was 544,000 pieces; eight years ago the output reached 17,819,000 pieces.

TABLE 1.—*Quantity of tight staves produced, by classes, 1909, 1911, and 1918.*

Class.	1918	1911	1909
Aggregate.....	<i>Thousands.</i> 286,401	<i>Thousands.</i> 357,198	<i>Thousands.</i> 379,231
Sawed, total.....	280,171	312,172	341,259
Oil and tierce.....	191,602	140,519	158,457
Half barrel and keg.....	28,159	20,030	19,356
Spirit and wine.....	15,690	36,318	38,933
Cut-offs.....	11,145	(¹)	14,239
Pork.....	9,366	11,629	13,457
Bourbon.....	950	24,398	11,991
All other.....	23,259	79,278	84,826
Hewed, total.....	4,295	7,187	6,321
Pipe.....	2,236	388	825
French claret.....	1,766	5,228	5,320
Tank.....		33	76
All other.....	293	1,538	100
Bucked and split, total.....	1,391	20,020	15,104
West Indian.....	741	2,381	2,517
Seconds.....	204	(¹)	1,390
Spirit and wine.....	176	3,076	1,949
Cut-offs.....	155	(¹)	471
Bourbon.....	85	9,860	8,332
Half barrel.....	30	(¹)	417
All other.....		4,703	28
Beer and ale, total.....	544	17,819	16,547
Beer, barrel.....		1,679	1,500
Beer, half barrel.....	188	5,599	6,217
Beer, quarter barrel.....	124	7,336	5,399
Beer, sixth barrel.....		256	1,056
Beer, eighth barrel.....	82	2,651	2,058
Ale, hogshead.....	150	177	145
All other ¹		121	112

¹ Included in the figures for "all other" in each class.

In Table 2 is given the production of tight staves arranged by classes and by States for 1918. Arkansas holds first place among the States in point of quantity produced with a total of 104,250,000 pieces, or 36 per cent of all the staves reported produced. California, Oregon, and Washington as a group rank second, with Mississippi, Tennessee, Alabama, Louisiana, Missouri, and Kentucky following in the order named. In all, reports were made by operators in 20 States.

TABLE 2.—*Quantity of tight staves produced, by classes and by States, 1918.*

State.	Aggregate.	Sawed.	Hewed.	Bucked and split.	Beer and ale.
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.
United States.....	286,401	280,171	4,295	1,391	544
Alabama.....	19,657	19,529	.....	50	78
Arkansas.....	104,250	102,840	350	786	274
Kentucky.....	12,938	12,116	100	530	192
Louisiana.....	17,917	17,413	479	25	.....
Mississippi.....	29,592	27,592	2,000	.....	.....
Missouri.....	14,753	14,753	.....	.....	.....
Tennessee.....	26,618	26,334	284	.....	.....
Texas.....	2,417	1,391	1,026	.....	.....
Virginia.....	8,429	8,373	56	.....	.....
West Virginia.....	1,821	1,821	.....	.....	.....
California, Oregon, and Washington.....	35,884	35,884	.....	.....	.....
All other States ¹	12,125	12,125	.....	.....	.....

¹ Includes Florida, Georgia, New Hampshire, North Carolina, Oklahoma, Pennsylvania, and Wisconsin.

Sawed staves formed 98 per cent of all the tight staves reported produced. Table 3 has been arranged to show the production of each class of staves for the several States. Owing to the difference in character of the woods which grow in the several States or regions, the class of stave produced varies to a certain extent.

Oak is essentially the best adapted for tight staves. Table 4 shows that of all the sawed staves cut, 38 per cent were of white oak and 29 per cent of red oak. Of the other principal woods used, gum furnished 14 per cent, Douglas fir 9 per cent, ash 3 per cent, hemlock 2 per cent, and spruce 2 per cent of the aggregate quantity produced.

TIGHT HEADING PRODUCTION.

The reported production of tight heading in 1918 was 20,711,271 sets. The production was slightly in excess of that reported for 1909 and 32 per cent under that for 1911. The proportion of sets of heading cut to stave production is as 1 to 14.¹ The aggregate of 20,063,254 sets of sawed heading was 29 per cent smaller than in 1911. The output of oil and tierce heading amounting to 13,972,160 sets was an increase over the 1911 cut of 22 per cent. Half barrel and keg heading sawed to the extent of 3,574,863 sets was a decrease of 27 per cent from the earlier period. The output of 692,527 sets of spirit and wine heading is about one-fifth and the output of 469,031 sets of bourbon heading about one-tenth of the reported cut of these classes in 1911. Production of beer and ale heading totaling 648,017 sets was a decrease of 67 per cent from the 1911 figures.

¹ The figures on their face indicate a relatively excess production of heading over staves. The explanation lies, however, in the fact that a large quantity of tight heading is utilized in repairing used barrels for further use.

TABLE 3.—*Quantity of sawed staves produced, by classes and by States, 1918.*

State.	Aggregate.	Oil and tierce.	Half-barrel and keg.	Spirit and wine.	Cut-offs.	Pork.	All other. ¹
	<i>Thousands.</i> 280,171	<i>Thousands.</i> 191,602	<i>Thousands.</i> 28,159	<i>Thousands.</i> 15,690	<i>Thousands.</i> 11,145	<i>Thousands.</i> 9,366	<i>Thousands.</i> 24,209
United States.....							
Alabama.....	19,529	18,284	420	300	311	132	82
Arkansas.....	102,840	70,833	7,939	10,250	7,704	3,558	2,556
Kentucky.....	12,116	10,149	7,705	699	298	265	.....
Louisiana.....	17,413	16,437	55	320	408	40	153
Mississippi.....	27,592	23,325	802	2,929	284	150	102
Missouri.....	14,753	5,477	2,389	1,151	445	3,179	2,112
Tennessee.....	26,334	18,568	4,367	9	1,192	1,682	516
Texas.....	1,391	1,230	70	32	59	.....	.....
Virginia.....	8,373	7,834	290	15	210	129	39
West Virginia.....	1,821	1,642	.....	.....	.....	.....	35
California, Oregon, and Washington.....	35,884	8,664	8,904	2,203	.....	.....	.....
All other States ²	12,125	9,159	.....	105	200	160	498

¹ Includes 950,000 Bourbon staves and 227,000 lead staves.² Includes Florida, Georgia, New Hampshire, North Carolina, Oklahoma, Pennsylvania, and Wisconsin.

TABLE 4.—Quantity of sawed staves produced, by kinds of wood and by classes, 1918.

Class.	Aggregate.	White oak.	Red oak.	Gum.	Douglas fir.	Ash.	Hemlock.	Spruce.
Total.....	<i>Thousands.</i> 280,171	<i>Thousands.</i> 105,443	<i>Thousands.</i> 81,205	<i>Thousands.</i> 39,292	<i>Thousands.</i> 24,324	<i>Thousands.</i> 9,325	<i>Thousands.</i> 5,824	<i>Thousands.</i> 5,736
Oil and tierce.....	191,602	74,526	72,892	32,667	8,531	699	133	.....
Half barrel and keg.....	28,159	5,460	3,483	5,515	4,279	2,547	4,625	.....
Spirit and wine.....	15,690	15,456	9	3,353	560	198	.....	.....
Cut-offs.....	11,145	5,599	.....	.....	.....	.....	.....	.....
Pork.....	9,366	2,043	859	134	200	5,819	.....	.....
Bourbon.....	950	950	221	6	.....	.....	.....	.....
Lead.....	227	221	603	.....	396	11,314	62	1,066
All other.....	23,032	1,188	.....	.....	.....	.....	.....	5,736
Class.	Birch.	Chestnut oak.	Maple.	Elm.	Cypress.	Beech.	Pine.	Hackberry.
Total.....	<i>Thousands.</i> 1,078	<i>Thousands.</i> 1,020	<i>Thousands.</i> 814	<i>Thousands.</i> 417	<i>Thousands.</i> 112	<i>Thousands.</i> 72	<i>Thousands.</i> 50	<i>Thousands.</i> 13
Oil and tierce.....	990	.....	814	154	10	50	.....	<i>Thousands.</i> 5,466
Half barrel and keg.....	1,078	.....	29	220	22	50	.....	950
Spirit and wine.....	.....	.....	.....	.....	.....	.....	.....	103
Cut-offs.....	.....	.....	.....	.....	.....	.....	.....	225
Pork.....	.....	.....	.....	.....	.....	.....	.....	1,356
Bourbon.....	.....	.....	.....	.....	.....	.....	.....	311
Lead.....	.....	.....	.....	.....	.....	.....	.....	.....
All other.....	.....	1	.....	43	102	.....	.....	2,521

TABLE 5.—*Quantity of tight heading produced, by classes, 1909, 1911, and 1918.*

Class.	1918	1911	1909
Aggregate.....	Sets. 20,711,271	Sets. 30,310,255	Sets. 20,691,201
Sawed, total.....	20,063,254	28,316,552	19,735,693
Oil and tierce.....	13,972,160	11,408,664	9,172,099
Half barrel and keg.....	3,574,863	4,866,100	1,680,004
Spirit and wine.....	692,527	3,250,891	2,207,596
Bourbon.....	469,031	4,487,159	1,289,713
Pork.....		309,759	393,319
All other.....	1,354,673	3,993,979	4,992,962
Beer and ale, total.....	648,017	1,993,703	955,508
Barrel.....	646,430	311,033	91,050
Quarter barrel.....	1,168	752,192	(1)
Half barrel.....	419	624,390	342,735
All other.....		306,088	521,723

¹ Included in "all other."

Table 6 shows the production of heading arranged by classes and by States. As in the case of staves, Arkansas also leads all other States in the number of sets of heading produced. Of the aggregate output of heading, 40 per cent was cut in Arkansas, 4 per cent in Kentucky, 15 per cent in Louisiana, 13 per cent in Mississippi, 11 per cent in Tennessee, and 9 per cent in California, Oregon, and Washington. Heading was reported produced in sixteen States.

Twelve species are shown in Table 7 to have been used in manufacturing tight heading. White oak furnished the greatest number of sets of heading turned out, amounting to 41 per cent of the aggregate output. The other kinds of wood principally used included red oak forming 26 per cent of the total, gum 16 per cent, Douglas fir 5 per cent, ash 5 per cent, western spruce 3 per cent, and western hemlock 1 per cent.

SLACK COOPERAGE PRODUCTION.

The reported production of 1,009,971,000 slack staves in 1918 was one-half the aggregate recorded for 1909 and a decrease of 24 per cent from the figures for 1911. The 60,751,000 sets of heading sawed compared with 140,234,000 sets produced in 1909 and 106,407,000 sets in 1911, are a decrease of 57 per cent and 43 per cent, respectively. The reported aggregate output of 332,684,000 hoops in 1918 was a falling off of 11 per cent from 1909 and 6 per cent from 1911.

If the 1918 production of slack cooperage was expressed in terms of barrels, figuring 16 staves, 1 set of heading, and 6 hoops to the package, the output would be sufficient staves for 63,123,188 barrels, the heading would complete 60,751,000 barrels, and the hoops 55,447,333 barrels.¹

In Table 8 has been arranged comparative data, according to the kinds of wood, for 1918, 1911, and 1909 on the quantity of staves, heading, and hoops reported cut. Red gum has increased in relative importance as the chief wood from which slack staves are cut, the 1918 cut of red gum staves making up almost 50 per cent of the reported production for all woods. Next in importance is pine, forming 11 per cent of the total,

¹ As far as hoops are concerned, a considerable loss occurs in working hoops, and thousands are used in reconditioning second-hand slack barrels.

TABLE 6.—Quantity of tight heading produced, by classes and by States, 1918.

State.	Aggregate.	Oil and tierce.	Half-barrel and keg.	Spirit and wine.	Bourbon.	All other.	Beer and ale.	
							Sets.	Sets.
United States.....	20,711,271	13,972,160	3,574,863	692,527	469,031	1,354,673	648,017	
Arkansas.....	8,160,138	5,877,094	634,601	283,263	442,406	276,344	646,430	
Kentucky.....	865,063	612,063	900	250,513	.....	.....	1,587	
Louisiana.....	3,030,785	1,666,035	1,355,750	.....	.....	.....	9,000	
Mississippi.....	2,791,958	2,501,294	234,416	48,498	92,309	26,625	7,750	
Tennessee.....	2,377,714	1,901,999	294,588	.....	.....	.....	62,193	
California, Oregon, and Washington.....	1,882,985	557,470	382,129	17,944	.....	.....	943,386	
All other States.....	1,602,628	856,205	672,479	.....	.....	.....	56,000	

¹ Includes Florida, Georgia, Missouri, North Carolina, Texas, Virginia, West Virginia, and Wisconsin.

TABLE 7—Quantity of tight heading produced, by kinds of wood and by classes, 1918.

followed by elm and ash, with 8 per cent each. With the exception of red gum and ash, the use of other woods for slack staves shows a decline from the returns for both 1909 and 1911.

Pine forms 44 per cent of all the slack heading reported cut, with red gum second and amounting to 21 per cent. Beech and maple were formerly largely utilized in making slack heading, but the output of heading from these woods in 1918 formed but 10 per cent and 4 per cent, respectively.

Elm, because of its tensile strength, has always been regarded as the most desirable wood for the making of coiled hoops. A few ash and hackberry hoops were reported cut in 1918, together with a small number made of hickory and ash, but 99 per cent of all the hoops made were of elm.

SLACK STAVE PRODUCTION.

The aggregate production of 1,009,971,000 slack staves cut in 1918 was reported from 27 States. The output by States and kinds of wood is detailed in Table 9. Twenty-two kinds of wood were utilized in making staves. From Arkansas was reported an output of 417,473,000 staves, or 42 per cent of the aggregate for all States. Next in order were Missouri, whose reported cut was 16 per cent of the whole, Virginia 8 per cent, Pennsylvania 6 per cent, and Mississippi 5 per cent.

SLACK HEADING PRODUCTION.

Nineteen woods were reported by the manufacturers of slack heading in producing an aggregate of 60,751,000 sets in 1918. The figures are given in detail in Table 10. Pine is the wood principally utilized for heading, forming 44 per cent of all heading reported. Alabama turned out more heading than any other one State, the 15,921,000 sets being 26 per cent of the aggregate of all States. Arkansas ranks second in point of production with 10 per cent, followed by Missouri with 9 per cent, Georgia with 8 per cent, Michigan with 6 per cent, and North Carolina and Wisconsin each with 5 per cent.

SLACK HOOP PRODUCTION.

Hoop production, as indicated in Table 11, is centered in six States, though hoops were reported cut in twelve States altogether. The six leading States, arranged according to their output, with the per cent cut by each, follow: Ohio 19 per cent, Arkansas 17 per cent, Mississippi 16 per cent, Michigan 9 per cent, Missouri 6 per cent, and Tennessee 6 per cent. Production in Ohio in 1918 was about one-half of what it was in 1911, and the same is true of Michigan. During the eight years the cut in Arkansas almost doubled, while that of Mississippi increased about six times.

TABLE 8.—*Slack cooperage stock—Quantity of staves, heading, and hoops produced, by kinds of wood, 1909, 1911, and 1918.*

Kind of wood.	Slack staves reported (thousands).			Slack heading reported (thousand sets).			Slack hoops reported (thousands).		
	1918	1911	1909	1918	1911	1909	1918	1911	1909
Total.....	1,009,971	1,328,968	2,029,548	60,751	106,407	140,234	332,684	353,215	375,793
Red gum.....	495,389	338,582	416,570	12,656	12,558	16,700	.....	.....	.....
Pine.....	109,349	229,220	306,621	26,735	25,513	38,926	.....	.....	.....
Elm.....	83,188	92,614	245,172	199	2,492	6,535	.....	.....	.....
Ash.....	83,022	66,716	71,705	1,947	7,302	5,245	330,353	333,297	339,477
Beech.....	47,228	121,727	268,237	5,930	11,915	19,269	.....	.....	.....
Birch.....	31,758	57,929	78,897	2,485	4,940	4,328	.....	.....	.....
Tupelo.....	28,751	37,501	22,500	2,184	3,891	3,296	.....	.....	.....
Cottonwood.....	28,714	37,382	66,260	1,005	2,535	6,742	.....	.....	.....
Maple.....	22,457	66,647	133,255	2,493	10,794	13,663	.....	.....	.....
Sycamore.....	21,384	(1)	(1)	319	(1)	(1)	.....	.....	.....
Oak.....	15,951	50,043	66,675	620	5,278	1,963	.....	.....	.....
Douglas fir.....	13,931	(1)	(1)	461	(1)	(1)	.....	.....	.....
Chestnut.....	13,075	71,273	93,290	360	1,177	876	.....	.....	.....
Hackberry.....	8,252	(1)	(1)	.....	(1)	(1)	2,167	(1)	.....
Spruce.....	3,224	70,189	72,219	538	3,647	1,861	.....	.....	.....
All other.....	4,298	89,145	188,147	2,819	14,065	20,830	110	19,918	36,316

¹If any, included in "all other" kinds.

TABLE 9.—*Slack staves produced, by kinds of wood and by States, 1918.*

State.	Aggregate.	Red gum.	Pine.	Elm.	Ash.	Beech.	Birch.	Tupelo.
United States	<i>Thousands.</i> 1,009,971	<i>Thousands.</i> 495,389	<i>Thousands.</i> 109,349	<i>Thousands.</i> 83,188	<i>Thousands.</i> 83,022	<i>Thousands.</i> 47,228	<i>Thousands.</i> 31,758	<i>Thousands.</i> 28,751
Alabama	42,072	66	39,496	48,949	63,515	31	4,787	
Arkansas	417,473	275,338	9,431	410	140	505		
Louisiana	11,604		100	2,675	985			
Maine	5,040							
Mississippi	50,077	44,812						150
Missouri	162,318	109,175		20,115	17,837	6,345	19,999	30
New York	33,835			1,089				
North Carolina	30,042	4,790	6,375					18,877
Pennsylvania	58,861		110					
Tennessee	40,608	14,603		2,716	360	38,463	5,756	250
Virginia	77,868	22,045	48,647	4,145		500	100	3,109
Wisconsin	4,821			3,089	125	1,829	5,351	1,548
All other States ²	75,352	15,129	13,661					
State.	Cottonwood.	Maple.	Sycamore.	Oak.	Douglas fir.	Chestnut.	Hackberry.	Spruce.
United States	<i>Thousands.</i> 28,714	<i>Thousands.</i> 22,457	<i>Thousands.</i> 21,384	<i>Thousands.</i> 15,951	<i>Thousands.</i> 13,931	<i>Thousands.</i> 13,075	<i>Thousands.</i> 8,252	<i>Thousands.</i> 3,224
Alabama	10,837	980	7,836	2,450	348	4,639	140	213
Arkansas	232			5		350		291
Louisiana	20			800				1,960
Maine	305							
Mississippi								
Missouri	2,874	1,080	6,060	2,487		2,550		110
New York		6,402						
North Carolina		12,882	4,738		825	498		
Pennsylvania		482						
Tennessee								25
Virginia								324
Wisconsin								
All other States ²	590	555	76	2,750	5,760	13,931	8,810	774

¹ Includes balsam fir, 1,860 thousand staves; hemlock, 852 thousand; willow, 550 thousand; yellow poplar, 349 thousand; cedar, 300 thousand; cypress, 237 thousand; and white fir, 150 thousand.

² Includes California, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, New Hampshire, New Jersey, New York, Oregon, South Carolina, Washington, and West Virginia.

TABLE 10.—*Slack heading produced, by kinds of wood and by States, 1918.*

State.	Aggregate.	Pine.	Red gum.	Beech.	Maple.	Birch.	Basswood.	Tupelo.	Ash.	Cotton-wood.	Oak.	All other kinds. ¹
	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.	Thousands sets.
United States	60,751	26,735	12,656	5,930	2,493	2,485	2,251	2,184	1,947	1,005	620	2,445
Alabama	15,921	14,698	869	...	...	...	...	...	...	...	...	...
Arkansas	5,800	3,887	3	...	...	...	...	...	...	...	...	...
Georgia	4,961	4,961	110	30	...	...	...	...	...	...	...	...
Louisiana	1,873	555	55	...	...	...	...	50	...	...	...	...
Maine	715	...	...	...	...	...	...	...	...	...	...	...
Michigan	3,824	2,413	789	500	37	...	...	...	12	3	10	60
Missouri	5,295	4,931	321	354	968	6	...	334	24	...	6	...
New York	1,682	440	2,004	1,722	613	192	...	613	...	...	...	33
North Carolina	3,057	2,527	...	...	...	...	...	...	...	...	...	...
Pennsylvania	440	...	...	...	...	...	...	...	...	...	...	...
Tennessee	1,995	1,525	544	9	...	...	...	...	...	10	339	112
Virginia	1,769	855	...	2	...	...	...	...	...	...	19	349
Wisconsin	3,018	3,591	391	1,474	635	433	2,028	380	...	15	71	71
All other States ²	8,314	3	...	...	...	...	180	83	2	91	35	1,490

¹ Includes spruce, 538 thousand sets; Douglas fir, 461 thousand sets; chestnut, 360 thousand sets; sycamore, 319 thousand sets; hemlock, 305 thousand sets; willow, 220 thousand sets; elm, 199 thousand sets; and tamarack, 10 thousand sets.

² Includes California, Florida, Illinois, Indiana, Kentucky, Minnesota, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oregon, Texas, Washington, and West Virginia.

TABLE 11.—*Slack hoops produced, by kinds of wood and by States, 1918.*

State.	Aggregate.	Elm.	Hackberry.	All other kinds. ¹
	<i>Thousands.</i>	<i>Thousands.</i>	<i>Thousands.</i>	<i>Thousands.</i>
United States.....	332,684	330,353	2,167	164
Arkansas.....	57,496	57,361	135	.....
Michigan.....	30,844	30,844	.....	.....
Mississippi.....	53,495	52,655	840	.....
Missouri.....	18,841	18,841	.....	.....
Ohio.....	62,159	62,159	.....	.....
Tennessee.....	18,819	18,819	.....	.....
All other States ²	91,030	89,674	1,192	164

¹ Includes hickory 110 thousand hoops, and ash 54 thousand.² Includes Florida, Illinois, Indiana, Louisiana, New York, and Wisconsin.

